

Chapter 8. Offshore/Oceanic Procedures

Section 1. General

8-1-1. ATC SERVICE

Provide air traffic control service in oceanic controlled airspace in accordance with the procedures in this chapter except when other procedures/minima are prescribed in a directive or a letter of agreement.

REFERENCE-

FAAO 7110.65, *Procedural Letters of Agreement, Para 1-1-8.*

8-1-2. OPERATIONS IN OFFSHORE AIRSPACE AREAS

Provide air traffic control service in offshore airspace areas in accordance with procedures and minima in this chapter. For those situations not covered by this chapter, the provisions in this Order shall apply.

8-1-3. VFR FLIGHT PLANS

VFR flights in Oceanic FIR's may be conducted in meteorological conditions equal to or greater than those specified in 14 CFR Section 91.155, Basic VFR weather minimums. Operations on a VFR flight plan are permitted only between sunrise and sunset and only within:

- a. Miami, Houston, and San Juan Oceanic Control Areas (CTA's) at or below FL 180.
- b. Within the Oakland FIR when operating less than 100 NM seaward from the shoreline within controlled airspace.
- c. All Oceanic FIR airspace below the Oceanic CTA's.

8-1-4. TYPES OF SEPARATION

Separation shall consist of at least one of the following:

- a. Vertical separation;
- b. Horizontal separation, either;
 1. Longitudinal; or
 2. Lateral;
- c. Composite separation;
- d. Radar separation, as specified in Chapter 5, Radar, where radar coverage is adequate.

8-1-5. ALTIMETER SETTING

Within oceanic control areas, unless directed and/or charted otherwise, altitude assignment shall be based on flight levels and a standard altimeter setting of 29.92 inches Hg.

8-1-6. RECEIPT OF POSITION REPORTS

When direct pilot controller communication is not available and a position report affecting separation is not received, take action to obtain the report no later than *10 minutes* after the control estimate.

8-1-7. OCEANIC NAVIGATIONAL ERROR REPORTING (ONER) PROCEDURES

FAAO 7110.82, *Monitoring of Navigational Performance in Oceanic Areas*, contains procedures for reporting and processing navigational errors observed by ATC radar for aircraft exiting oceanic airspace.

Section 2. Coordination

8-2-1. GENERAL

ARTCC's shall:

- a. Forward to appropriate ATS facilities, as a flight progresses, current flight plan (CPL) and control information.
- b. Coordinate flight plan and control information in sufficient time to permit the receiving facility to analyze the data and to effect any necessary additional coordination. This may be specified in a letter of agreement.
- c. Coordinate with adjacent ATS facilities when airspace to be protected will overlap the common boundary.
- d. Forward revisions of estimates of *3 minutes* or more to the appropriate ATS facility.
- e. Coordinate with adjacent facilities on IFR and VFR flights to ensure the continuation of appropriate air traffic services.

8-2-2. TRANSFER OF CONTROL AND COMMUNICATIONS

- a. Only one air traffic control unit shall control an aircraft at any given time.
- b. The control of an aircraft shall be transferred from one control unit to another at the time the aircraft is

estimated to cross the control boundary or at such other point or time agreed upon by the two units.

- c. The transferring unit shall forward to the accepting unit any changed flight plan or control data which are pertinent to the transfer.
- d. The accepting unit shall notify the transferring unit if it is unable to accept control under the terms specified, or it shall specify the changes or conditions required so that the aircraft can be accepted.
- e. The accepting unit shall not alter the clearance of an aircraft that has not yet reached the transfer of control point without the prior approval of the transferring unit.
- f. Where nonradar separation minima are being applied, the transfer of air-ground communications with an aircraft shall be made *5 minutes* before the time at which the aircraft is estimated to reach the boundary unless otherwise agreed to by the control and/or communication units concerned.

8-2-3. AIR TRAFFIC SERVICES INTERFACILITY DATA COMMUNICATIONS (AIDC)

Where interfacility data communications capability has been implemented, its use for ATC coordination should be accomplished in accordance with regional Interface Control Documents, and supported by letters of agreement between the facilities concerned.

Section 3. Longitudinal Separation

8-3-1. APPLICATION

Separate aircraft by providing a time or distance interval between aircraft consistent with the required minima. Longitudinal separation expressed in distance may be applied as prescribed in Chapter 6, Nonradar.

NOTE-

Longitudinal separation minima is contained in:

Section 7. North Atlantic ICAO Region.

Section 8. Caribbean ICAO Region.

Section 9. Pacific ICAO Region.

Section 10. North American ICAO Region- Arctic CTA.

8-3-2. SEPARATION METHODS

Separate aircraft longitudinally in accordance with the following:

- a. **Same courses.** Ensure that the spacing between aircraft is not less than the applicable minimum required. (See FIG 8-3-1.)

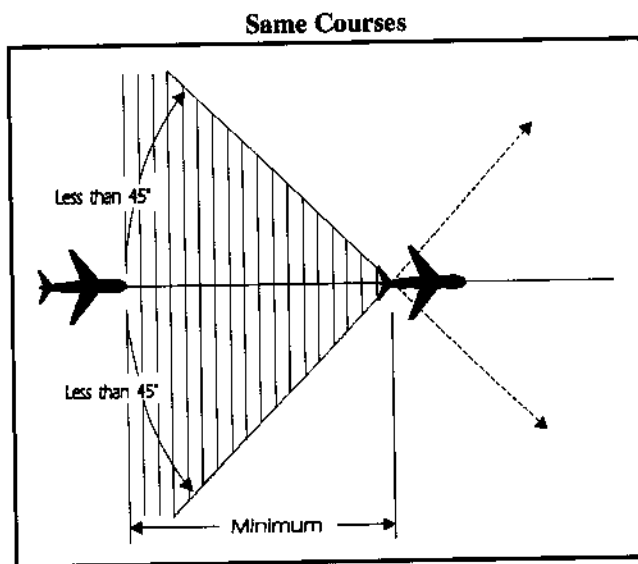


FIG 8-3-1

- b. **Crossing courses.** Ensure that the spacing at the point of intersection is not less than the applicable minimum required. (See FIG 8-3-2.)

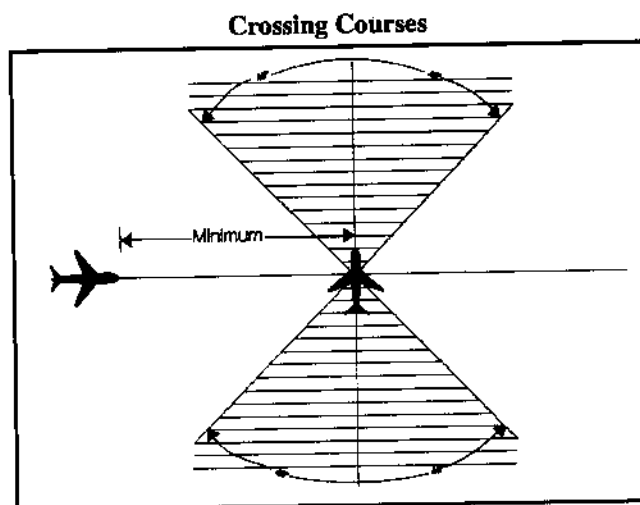


FIG 8-3-2

- c. **Reciprocal courses:**

1. Ensure that aircraft are vertically separated for a time interval equal to the applicable minimum required before and after the aircraft are estimated to pass. (See FIG 8-3-3.)

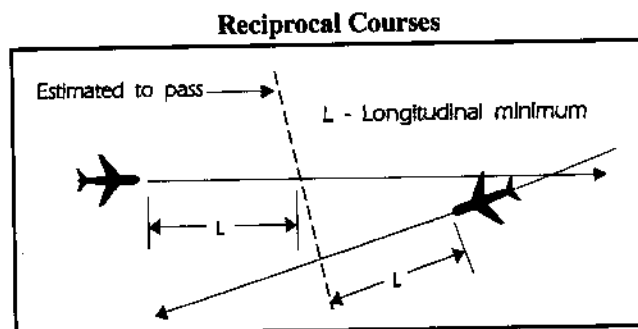


FIG 8-3-3

2. Vertical separation may be discontinued after one of the following conditions are met:

(a) Both aircraft have reported passing a significant point and the aircraft are separated by at least the applicable minimum required for the same direction longitudinal spacing; (See FIG 8-3-4.) or

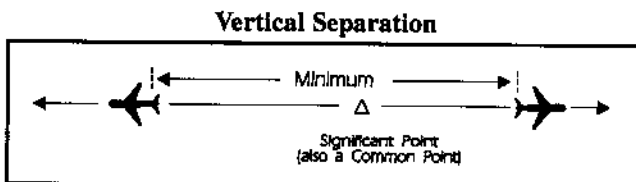


FIG 8-3-4

(b) Both aircraft have reported passing ground-based NAVAID's or DME fixes indicating that they have passed each other.

8-3-3. MACH NUMBER TECHNIQUE

The following conditions shall be met when the Mach number technique is being applied:

a. **Aircraft Types:** Turbojet aircraft only.

b. **Routes:**

1. The aircraft follow the same track or continuously diverging tracks, and

2. The aircraft concerned have reported over a common point; or

3. If the aircraft have *not* reported over a common point, either radar or other approved means are used to ensure that the appropriate time interval will exist at the common point; or

4. If a common point does not exist, either radar or other approved means are used to verify that the appropriate time interval will exist at a significant point on each track from which the tracks continuously diverge.

c. **Altitudes:**

1. Assign only a single cardinal altitude to each aircraft.

2. The aircraft concerned are in level, climbing or descending flight.

d. **Mach Number Assignment:**

1. A Mach number (or, when appropriate, a range of Mach numbers) shall be issued to each aircraft.

NOTE-

1. ICAO Doc 7030/4 requires pilots to strictly adhere to the last assigned Mach number (or range of Mach numbers), even during climbs and descents, unless revised by ATC.

2. When it is necessary to issue crossing restrictions to ensure the appropriate time interval, it may be impossible for an aircraft to comply with both the clearance to meet the crossing restrictions and the clearance to maintain a single, specific Mach number.

REFERENCE-

ICAO DOC 9426-AN/924, Part II, Section 2, Para 2.3.4, Para 2.4.7, and Para 2.5.3.

EXAMPLE-

"Maintain Mach point eight four or greater."

"Maintain Mach point eight three or less."

"Maintain Mach point eight two or greater; do not exceed Mach point eight four."

e. **Separation Criteria:**

1. The use of Mach number technique allows for the application of reduced longitudinal separation minima. However, the prescribed longitudinal separation between successive aircraft flying at the same level shall be provided over the entry point *and* on a particular track or tracks, or exist when climb or descent to the level of another aircraft is accomplished into the area concerned.

2. The applicable longitudinal separation minima is maintained by:

(a) Ensuring that the spacing between the estimated positions of the aircraft is not less than the prescribed minimum.

(b) Continuously monitoring aircraft position reports and updating control estimates along the aircraft's track(s). If after establishing the Mach number technique between aircraft, control information indicates that less than the applicable minima between aircraft may exist, immediately:

(1) Issue crossing restrictions to ensure the appropriate longitudinal minima at the next significant point, or

(2) Assign revised Mach numbers appropriate for the estimated interval, or

(3) Establish vertical separation.

NOTE-

Control estimates are calculated by the controller using known wind patterns, previous aircraft transit times, pilot progress reports, and pilot estimates.

f. Relative Speeds:

1. The lead aircraft maintains the same or a greater Mach number than the following aircraft; or

2. If the following aircraft is faster than the lead aircraft, ensure that the appropriate time interval will exist until another form of separation is achieved.

NOTE-

A "rule-of-thumb" may be applied which allows clearances to be issued in a timely manner, provided the expected minimum longitudinal separation over the exit point is subsequently confirmed when the calculated flight progress strip data becomes available. This rule-of-thumb can be stated as follows: For each 600 NM in distance between the entry and exit points of the area where the Mach Number Technique is used, add 1 minute for each 0.01 difference in Mach number for the two aircraft concerned to compensate for the fact that the second aircraft is overtaking the first aircraft. (See TBL 8-3-1.)

Application of the Mach Number Technique When the Following Aircraft is Faster

<i>Difference in Mach</i>	<i>Distance to Fly and Separation (in Minutes) Required at Entry Point</i>				
	<i>001-600 NM</i>	<i>601-1200 NM</i>	<i>1201-1800 NM</i>	<i>1801-2400 NM</i>	<i>2401-3000 NM</i>
0.01	11	12	13	14	15
0.02	12	14	16	18	20
0.03	13	16	19	22	25
0.04	14	18	22	26	30
0.05	15	20	25	30	35
0.06	16	22	28	34	40
0.07	17	24	31	38	45
0.08	18	26	34	42	50
0.09	19	28	37	46	55
0.10	20	30	40	50	60

TBL 8-3-1

Section 4. Lateral Separation

8-4-1. APPLICATION

Separate aircraft by assigning different flight paths whose widths or protected airspace do not overlap.

Within that portion of the Gulf of Mexico Low Offshore airspace controlled by Houston ARTCC, use 12 NM between aircraft whose flight paths are defined by published Grid System waypoints.

NOTE-

1. The Grid System is defined as those waypoints contained within the Gulf of Mexico Low Offshore airspace and published on the IFR Vertical Flight Reference Chart.

2. Lateral separation minima is contained in:
 Section 7, North Atlantic ICAO Region.
 Section 8, Caribbean ICAO Region.
 Section 9, Pacific ICAO Region.
 Section 10, North American ICAO Region - Arctic CTA.

8-4-2. SEPARATION METHODS

Lateral separation exists for:

a. Nonintersecting flight paths:

1. When the required distance is maintained between the flight paths; or (See FIG 8-4-1.)

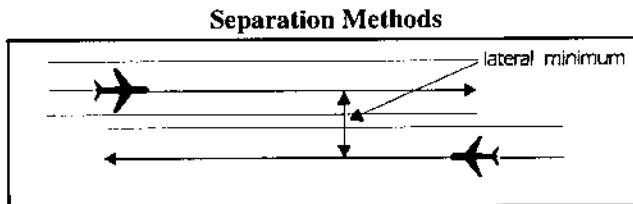


FIG 8-4-1

2. When reduced route protected airspace is applicable, and the protected airspace of the flight paths do not overlap; or (See FIG 8-4-2.)

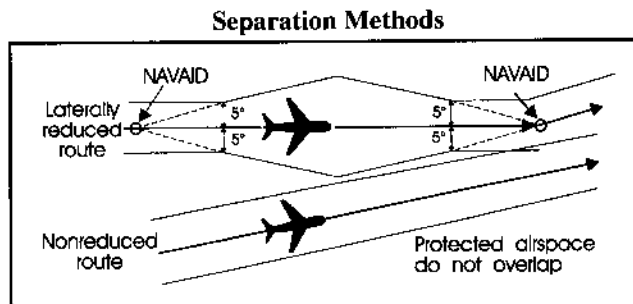


FIG 8-4-2

3. When aircraft are crossing an oceanic boundary and are entering an airspace with a larger lateral minimum than the airspace being exited; and

(a) The smaller separation exists at the boundary; and

(b) Flight paths diverge by 15° or more until the larger minimum is established. (See FIG 8-4-3.)

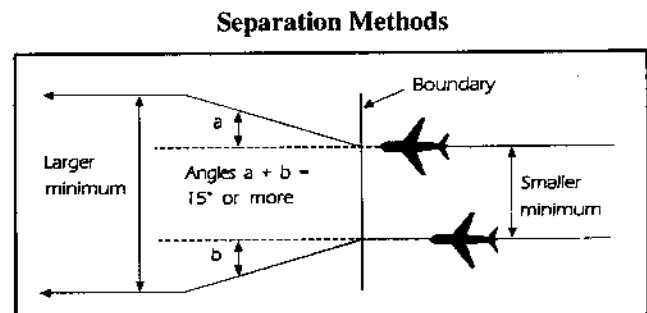


FIG 8-4-3

b. Intersecting flight paths with constant and same width protected airspace when either aircraft is at or beyond a distance equal to the applicable lateral separation minimum measured perpendicular to the flight path of the other aircraft. (See FIG 8-4-4.)

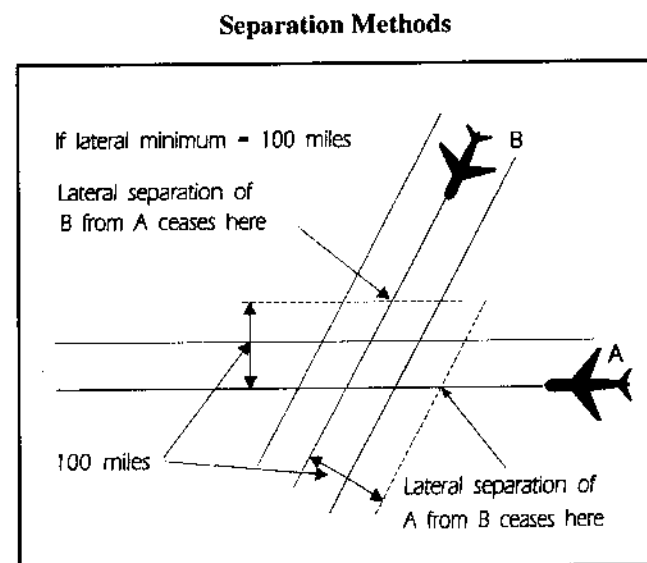


FIG 8-4-4

c. Intersecting flight paths with constant but different width protected airspace when either aircraft is at or beyond a distance equal to the sum of the protected airspace of both flight paths measured perpendicular to the flight path of the other aircraft. (See FIG 8-4-5.)

d. Intersecting flight paths with variable width protected airspace when either aircraft is at or beyond a distance equal to the sum of the protected airspace of both flight paths measured perpendicular to the flight path of the other aircraft. Measure protected airspace for each aircraft perpendicular to its flight path at the first point or the last point, as applicable, of protected airspace overlap.

Separation Methods

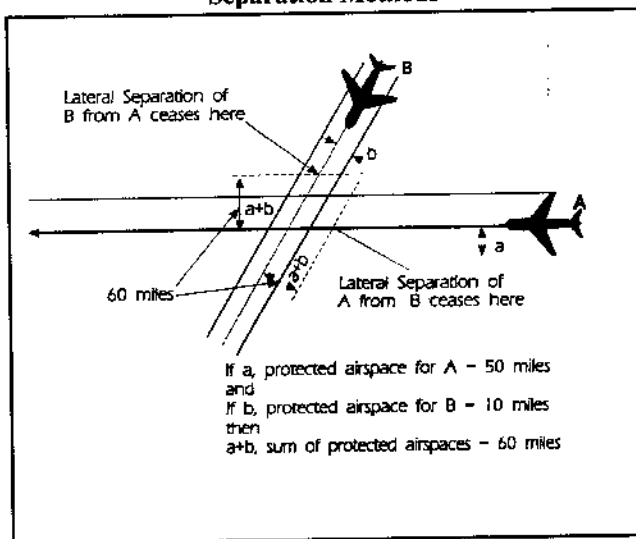


FIG 8-4-5

NOTE-

In FIG 8-4-5, the protected airspace for westbound flight A is distance "a" (50 miles), and for southwestbound flight B, distance "b" (10 miles). Therefore, the sum of distances "a" and "b"; i.e., the protected airspace of Aircrafts A and B, establishes the lateral separation minimum (60 miles) applicable for either flight relevant to the other.

Separation Methods

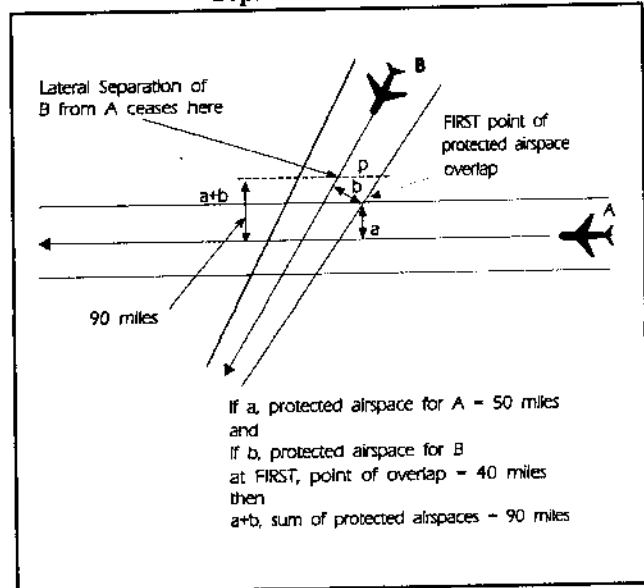


FIG 8-4-6

NOTE-

(See FIG 8-4-6.) At the first point of protected airspace overlap, the protected airspace for westbound flight A is distance "a" (50 miles), and for southwestbound flight B, distance "b" (40 miles). The sum of distances "a" and "b" (90 miles) establishes the lateral separation minimum applicable in this example for either flight as it approaches the intersection. For example, Aircraft B should be vertically separated from Aircraft A by the time it reaches point "p."

Separation Methods

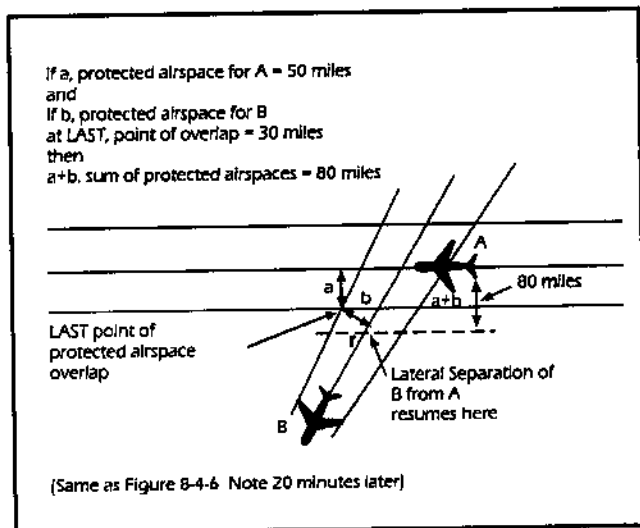


FIG 8-4-7

NOTE-

(See FIG 8-4-7.) Distance "a" (50 miles) and "b" (30 miles) are determined at the last point of protected airspace overlap. The sum of the distances "a" and "b" (80 miles) establishes the lateral separation minima applicable for either flight after it passes beyond the intersection. For example, Aircraft B could be cleared to, or through, Aircraft A's altitude after passing point "r."

8-4-3. REDUCTION OF ROUTE PROTECTED AIRSPACE

When routes have been satisfactorily flight checked and notice has been given to users, reduction in route protected airspace may be made as follows:

- Below FL 240, reduce the width of the protected airspace to 5 miles on each side of the route centerline to a distance of 57.14 miles from the NAVAID, then increasing in width on a 5° angle from the route centerline, measured at the NAVAID, to the maximum width allowable within the lateral minima; for example, 50 miles of protected airspace on each side of centerline; i.e., a lateral minimum of 100 miles. (See FIG 8-4-8.)

Reduction of Route Protected Airspace

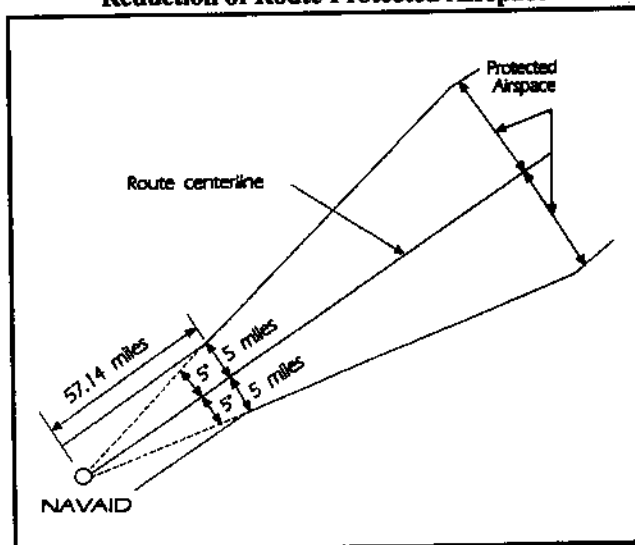


FIG 8-4-8

- At and above FL 240, reduce the width of the protected airspace to 10 miles on each side of the route centerline to a distance of 114.29 miles from the NAVAID, then increasing in width on a 5° angle from the route centerline, as measured at the NAVAID, to the maximum width allowable within the lateral minima; for example, 60 miles of protected airspace on each side of the centerline; i.e., a lateral separation minimum of 120 miles. (See FIG 8-4-9.)

Reduction of Route Protected Airspace

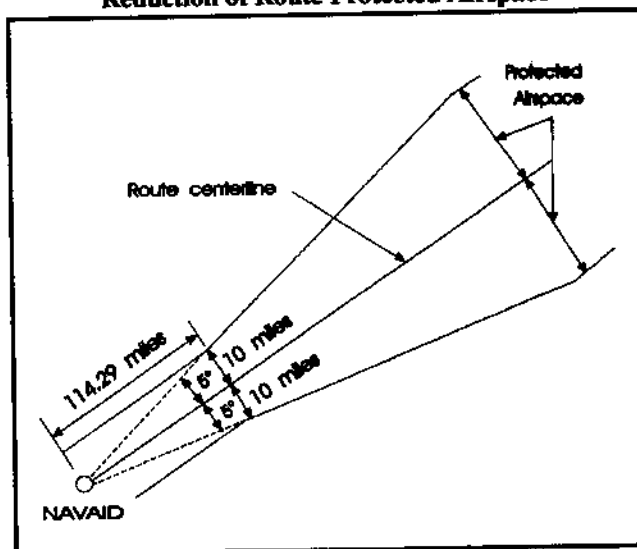


FIG 8-4-9

8-4-4. TRACK SEPARATION

Apply track separation between aircraft by requiring aircraft to fly specified tracks or radials and with specified spacings as follows:

a. Same NAVAID:

1. VOR/VORTAC/TACAN. Consider separation to exist between aircraft established on radials of the same NAVAID that diverge by at least 15 degrees when either aircraft is clear of the airspace to be protected for the other aircraft. Use TBL 8-4-1 to determine the flight distance required for various divergence angles and altitudes to clear the airspace to be protected. (See FIG 8-4-10.)

**Divergence-Distance Minima
VOR/VORTAC/TACAN**

Divergence (degrees)	Distance (mile)	
	FL 230 and below	FL 240 through FL 450
15-25	17	18
26-35	11	13
36-90	8	11

Note: This table compensates for DME slant range error.

TBL 8-4-1

**Track Separation
VOR**

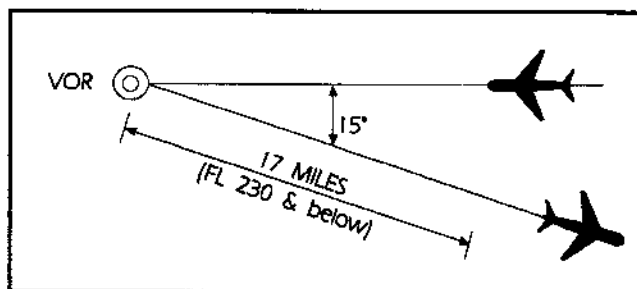


FIG 8-4-10

2. NDB:

(a) Consider separation to exist between aircraft established on tracks of the same NAVAID that diverge by at least 30 degrees and one aircraft is at least 15 miles from the NAVAID. This separation shall not be used when one or both aircraft are inbound to the aid unless the distance of the aircraft from the facility can be readily determined by reference to the NAVAID. Use TBL 8-4-2 to determine the flight distance required for various divergence angles to clear the airspace to be protected. For divergence that falls between two values, use the lesser value to obtain the distance. (See FIG 8-4-11.)

Divergence-Distance Minima (NDB)

Divergence (degrees)	Distance (mile)	
	FL 230 and below	FL 240 through FL 450
30	16	17
45	13	14
60	9	10
75	7	8
90	6	7

Note: This table compensates for DME slant range error.

TBL 8-4-2

**Track Separation
NDB**

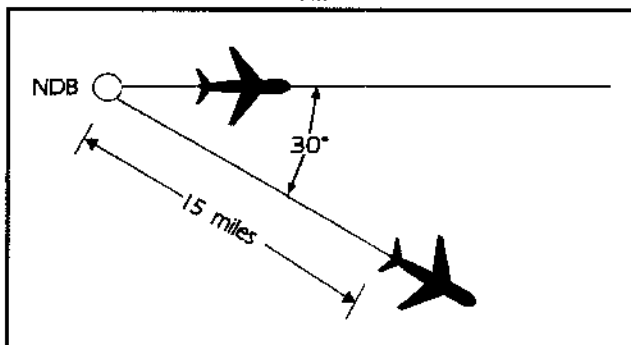


FIG 8-4-11

(b) Clear aircraft navigating on NDB facilities in accordance with para 2-5-2, NAVAID Terms.

b. Different NAVAID's: Separate aircraft using different navigation aids by assigning tracks so that their protected airspace does not overlap. (See FIG 8-4-12.)

**Track Separation
Different NAVAID's**

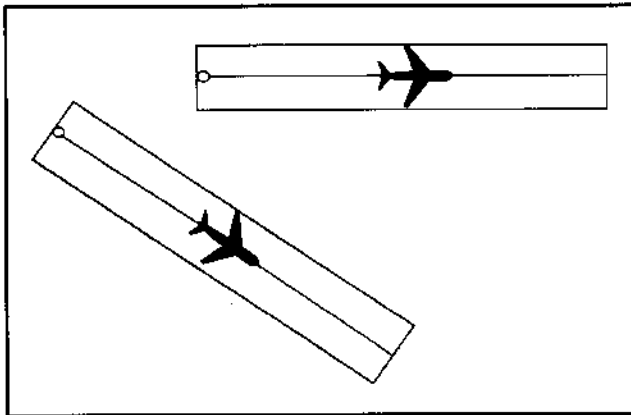


FIG 8-4-12

c. Dead Reckoning (DR):

1. Consider separation to exist between aircraft established on tracks that diverge by at least 45 degrees when one aircraft is at least 15 miles from the point of intersection of the tracks. This point may be determined either visually or by reference to a navigation aid. (See FIG 8-4-13.)

**Track Separation
Dead Reckoning**

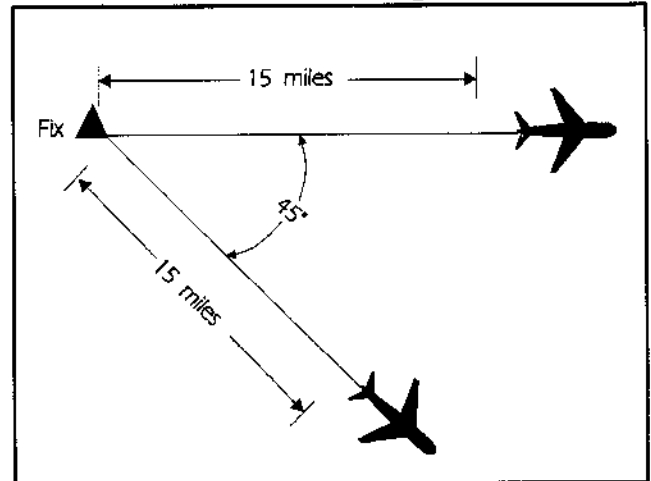


FIG 8-4-13

Section 5. Offshore/Oceanic Transition Procedures

8-5-1. ALTITUDE/FLIGHT LEVEL TRANSITION

When vertical separation is applied between aircraft crossing the offshore/oceanic airspace boundary below FL 180, control action shall be taken to ensure that differences between the standard altimeter setting (QNE) and local altimeter setting (QNH) do not compromise separation. (See FIG 8-5-1.)

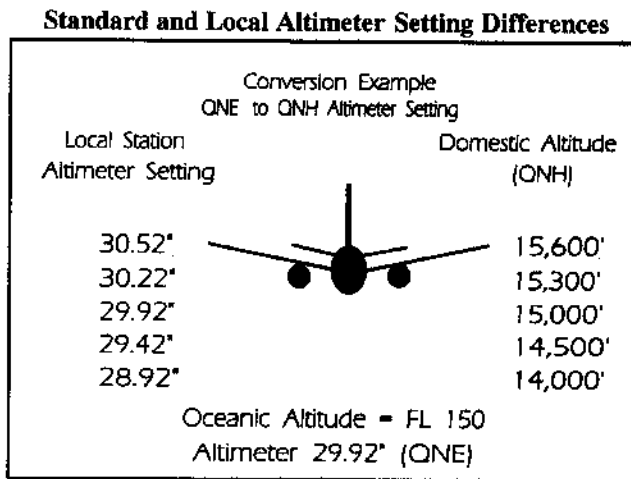


FIG 8-5-1

8-5-2. COURSE DIVERGENCE

When aircraft are entering oceanic airspace, separation will exist in oceanic airspace when:

- a. Domestic lateral separation exists at the oceanic control boundary;

- b. Courses diverge by at least 15° until the oceanic lateral separation is established.

8-5-3. OPPOSITE DIRECTION

When transitioning from an offshore airspace area to oceanic airspace, an aircraft may climb through opposite direction oceanic traffic provided vertical separation above that traffic is established:

- a. Before the outbound crosses the offshore/oceanic boundary; and
- b. 15 minutes before the aircraft are estimated to pass. (See FIG 8-5-2.)

Transitioning From Offshore to Oceanic Airspace Opposite Direction

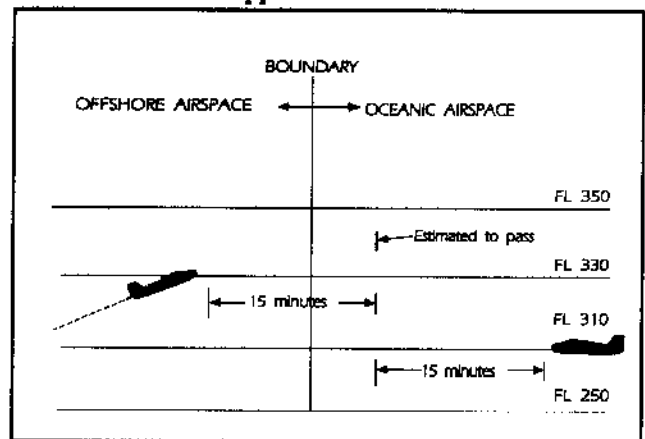


FIG 8-5-2

8-5-4. SAME DIRECTION

When transitioning from an offshore airspace area to oceanic airspace or while within oceanic airspace, apply 5 minutes minimum separation when a following aircraft on the same course is climbing through the altitude of the preceding aircraft if the following conditions are met:

- a. The preceding aircraft is level at the assigned altitude and is maintaining a speed equal to or greater than the following aircraft; and
- b. The minimum of 5 minutes is maintained between the preceding and following aircraft; and
- c. The following aircraft is separated by not more than 4,000 feet from the preceding aircraft when the climb clearance is issued; and
- d. The following aircraft commences climb within 10 minutes after passing:
 1. An exact reporting point (DME fix or intersection formed from NAVAID's) which the preceding aircraft has reported; or
 2. A radar observed position over which the preceding aircraft has been observed; and

e. The following aircraft is in direct communication with air traffic control until vertical separation is established. (See FIG 8-5-3.)

**Transitioning From Offshore to Oceanic Airspace
Same Direction**

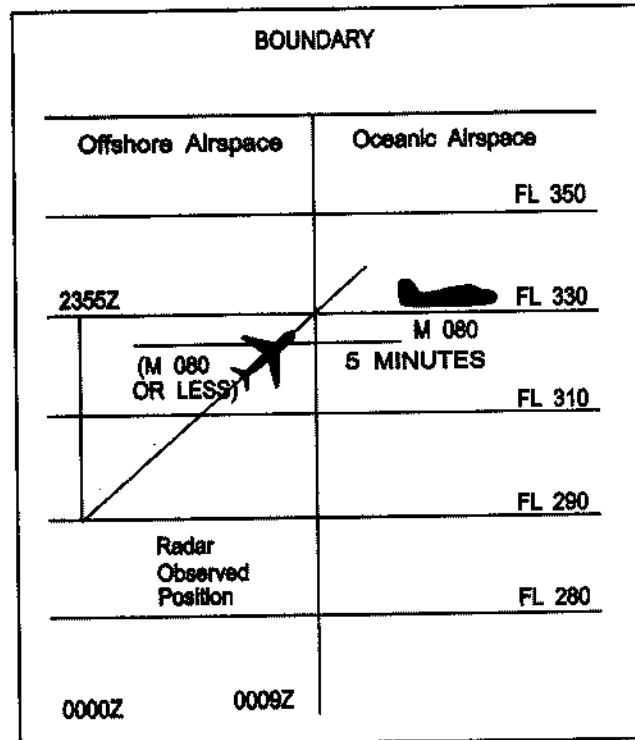


FIG 8-5-3

Section 6. Separation from Airspace Reservations

8-6-1. TEMPORARY STATIONARY AIRSPACE RESERVATIONS

Separate aircraft from a temporary stationary reservation by one of two methods:

- a. **Laterally:** Clear aircraft so that the protected airspace along the route of flight does not overlap the geographical area of the stationary reservation. (See FIG 8-6-1.)

Temporary Stationary Airspace Reservations
Lateral Separation

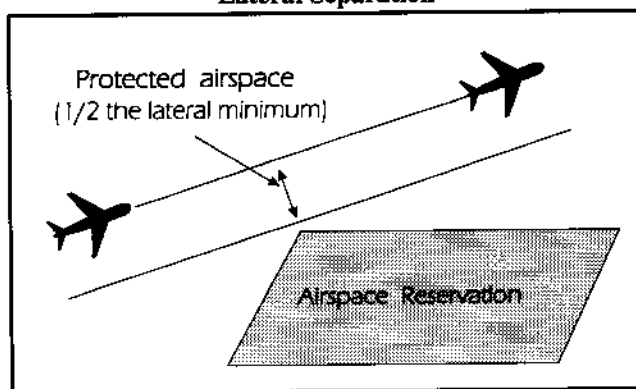


FIG 8-6-1

- b. **Vertically:** Clear aircraft so that vertical separation exists while the aircraft is within a geographical area defined as the stationary reservation plus a buffer around the perimeter equivalent to one-half the lateral separation minimum. (See FIG 8-6-2.)

Temporary Stationary Airspace Reservations
Vertical Separation

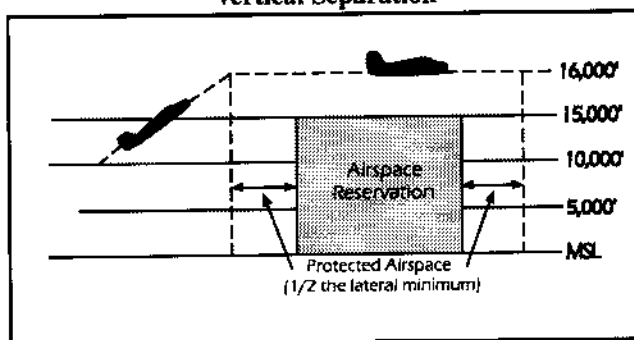


FIG 8-6-2

8-6-2. REFUSAL OF AVOIDANCE CLEARANCE

If a pilot refuses to accept a clearance to avoid a reservation, inform him/her of the potential hazard, advise him/her that services will not be provided while the flight is within the reservation and, if possible, inform the appropriate using agency.

8-6-3. TEMPORARY MOVING AIRSPACE RESERVATIONS

Separate aircraft from a temporary moving airspace reservation by one of the following methods:

- a. **Laterally:** Clear aircraft so that the protected airspace along the route of flight does not overlap the (time-dependent) geographical area of the moving airspace reservation.
- b. **Longitudinally:** Clear aircraft so that the appropriate longitudinal minimum exists ahead of the first or behind the last aircraft operating within the reservation.
- c. **Vertically:** Clear aircraft so that vertical separation exists while the aircraft is within a (time-dependent) geographical area defined as the moving airspace reservation plus a buffer around the perimeter equivalent to one-half the lateral separation minimum.

Section 7. North Atlantic ICAO Region

8-7-1. APPLICATION

Provide air traffic control services in the North Atlantic ICAO Region with the procedures and minima contained in this section except when noted otherwise.

8-7-2. VERTICAL SEPARATION

Provide vertical separation in accordance with Chapter 4, IFR, Section 5, Altitude Assignment and Verification.

8-7-3. LONGITUDINAL SEPARATION

Provide longitudinal separation between aircraft as follows:

a. Supersonic flight:

1. Provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique:

(a) 10 minutes; or

(b) 10 minutes when one or both aircraft has been cleared to commence the deceleration/descent phase of supersonic flight and the preceding aircraft is maintaining a Mach number which is the same as or greater than that of the following aircraft.

2. 15 minutes between all other aircraft.

b. Operations wholly or partly in Minimum Navigation Performance Specification (MNPS) Airspace (*subsonic flight*):

1. 10 minutes, provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique; and

(a) Where tracks diverge from the common point:

(1) At least 10 minutes longitudinal separation exists at the point where the tracks diverge; and

(2) At least 5 minutes longitudinal separation will exist where 60 NM lateral separation is achieved; and

NOTE-

When the preceding aircraft is maintaining a greater Mach number than the following aircraft in accordance with this subparagraph, and the aircraft will follow continuously diverging tracks so that 60 NM lateral separation will be achieved by the next significant point, the requirement to have at least 5 minutes longitudinal separation where 60 NM lateral separation is achieved, may be disregarded.

(3) At least 60 NM lateral separation will be achieved at or before the next significant point (normally within ten degrees of longitude along track(s)) or, if not, within 90 minutes of the time the second aircraft passes the common point or is within 600 NM of the common point, whichever is estimated to occur first.

(b) Between 9 and 5 minutes, provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique; and

(1) It is possible to ensure, by radar or other approved means, that the required time interval exists and will exist at the common point from which they either follow the same track or continuously diverging tracks; and

(2) The preceding aircraft is maintaining a greater Mach number than the following aircraft in accordance with the following:

[a] 9 minutes, if the preceding aircraft is Mach 0.02 faster than the following aircraft;

[b] 8 minutes, if the preceding aircraft is Mach 0.03 faster than the following aircraft;

[c] 7 minutes, if the preceding aircraft is Mach 0.04 faster than the following aircraft;

[d] 6 minutes, if the preceding aircraft is Mach 0.05 faster than the following aircraft;

[e] 5 minutes, if the preceding aircraft is Mach 0.06 faster than the following aircraft.

2. 15 minutes between turbojet aircraft not covered by para 8-7-3, Longitudinal Separation.

c. Operations in the West Atlantic Route System (WATRS) (subsonic flight):

NOTE-

The WATRS area is defined as beginning at a point 27°00'N/77°00'W direct to 20°00'N/67°00'W direct to 18°00'N/62°00'W direct to 18°00'N/60°00'W direct to 38°30'N/60°00'W direct to 38°30'N/69°15'W, thence counterclockwise along the New York Oceanic CTA/FIR boundary to the Miami Oceanic CTA/FIR boundary, thence southbound along the Miami Oceanic CTA/FIR boundary to the point of beginning.

1. Between all aircraft *15 minutes*; or

2. Aircraft operating at or above FL 280 within the WATRS area or west of 60° West when in transit to or from WATRS:

(a) *10 minutes* provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique; and

(1) Where tracks diverge from the common point:

[a] At least *10 minutes* longitudinal separation exists at the point where the tracks diverge; and

[b] At least *5 minutes* longitudinal separation will exist where the minimum lateral separation is achieved; and

[c] At least the minimum lateral separation will be achieved at or before the next significant point or, if not, within *90 minutes* of the time the second aircraft passes the common point or is within 600 NM of the common point, whichever is estimated to occur first;

(2) If the aircraft have not reported over a common point, it is possible to ensure, by radar or other approved means, that the appropriate time interval will exist at the common point from which they either follow the same track or continuously diverging tracks;

(b) *Between 9 and 5 minutes*, provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique; and

(1) It is possible to ensure by radar or other approved means, that the required time interval exists and will exist at the common point from which they either follow the same track or continuously diverging tracks; and

(2) The preceding aircraft is maintaining a greater Mach number than the following aircraft in accordance with the following:

[a] *9 minutes*, if the preceding aircraft is Mach 0.02 faster than the following aircraft;

[b] *8 minutes*, if the preceding aircraft is Mach 0.03 faster than the following aircraft;

[c] *7 minutes*, if the preceding aircraft is Mach 0.04 faster than the following aircraft;

[d] *6 minutes*, if the preceding aircraft is Mach 0.05 faster than the following aircraft;

[e] *5 minutes*, if the preceding aircraft is Mach 0.06 faster than the following aircraft.

NOTE-

When the preceding aircraft is maintaining a greater Mach number than the following aircraft, in accordance with the above, and the aircraft will follow continuously diverging tracks so that the minimum lateral separation will be achieved by the next significant point, the requirement to have at least 5 minutes longitudinal separation where the minimum lateral separation is achieved, may be disregarded.

d. Operations outside of MNPS airspace (subsonic flight): Apply the following minimum longitudinal separation:

1. *15 minutes* between turbojet aircraft, provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique.

2. Between turbojet aircraft, provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique, and *only* when it is possible to ensure by radar or other approved means that the required time interval exists and will exist at the common point:

(a) *10 minutes* when the preceding aircraft is at least Mach 0.03 faster than the following aircraft; or

(b) *5 minutes* when the preceding aircraft is at least Mach 0.06 faster than the following aircraft.

3. *20 minutes:*

(a) Between turbojet aircraft not covered by subparas d1 or 2; and

(b) Between other than turbojet aircraft operating along routes extending between the U.S., Canada, or Bermuda and points in the Caribbean Region, or between the U.S. or Canada and Bermuda; and

4. *30 minutes* between other than turbojet aircraft except those covered in subpara 3(b) above.

8-7-4. LATERAL SEPARATION

Provide lateral separation by assigning different flight paths whose widths or protected airspace do not overlap. Apply the following:

- a. 60 NM or 1 degree latitude between:
 1. Supersonic aircraft operating above FL 275.
 2. Aircraft which meet the MNPS and which:

NOTE-

This reduced lateral separation shall not be used if track keeping capability of the aircraft has been reduced for any reason.

- (a) Operate within MNPS airspace; or
- (b) Are in transit to or from MNPS airspace; or
- (c) Operate for part of their flight within MNPS airspace but are cleared to operate immediately above or below such airspace for a portion of their flight.

b. 90 NM or 1 and $\frac{1}{2}$ degrees latitude between aircraft operating:

1. Within WATRS;
2. Between the U.S., Canada, and Bermuda;
3. West of 55° West between the U.S., Canada, or Bermuda and points in the Caribbean ICAO Region.

c. 120 NM or 2 degrees latitude between aircraft not covered by subparas a or b above.

NOTE-

Tracks may be spaced with reference to their difference in latitude, provided that in any interval of 10 degrees of longitude the change in latitude of at least one of the tracks does not exceed 3 degrees when operating south of 58° North.

Section 8. Caribbean ICAO Region

8-8-1. APPLICATION

Provide air traffic control services in the Caribbean ICAO Region with the procedures and minima contained in this section except when noted otherwise.

8-8-2. VERTICAL SEPARATION

Provide vertical separation in accordance with Chapter 4, IFR, Section 5, Altitude Assignment and Verification.

8-8-3. LONGITUDINAL SEPARATION

Provide longitudinal separation between aircraft as follows:

a. Supersonic flight:

1. Provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique;

(a) 10 minutes; or

(b) 10 minutes when one or both aircraft has been cleared to commence the deceleration/descent phase of supersonic flight and the preceding aircraft is maintaining a Mach number which is the same as or greater than that of the following aircraft.

2. 15 minutes between all other aircraft.

b. Operations in the West Atlantic Route System (WATRS) (subsonic flight):

1. Between all aircraft within the San Juan CTA/FIR 15 minutes; or

2. Aircraft operating at or above FL 280 within the WATRS area or west of 60° West when in transit to or from WATRS;

(a) 10 minutes, provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique; and

(1) Where tracks diverge from the common point:

(2) At least 10 minutes, longitudinal separation exists at the point where the tracks diverge; and

(3) At least 5 minutes, longitudinal separation will exist where the minimum lateral separation is achieved; and

(4) At least the minimum lateral separation will be achieved at or before the next significant point; or, if not, within 90 minutes of the time the second aircraft passes the common point or is within 600 NM of the common point, whichever is estimated to occur first;

NOTE-

The WATRS area is defined as beginning at a point 27°00'N/77°00'W direct to 20°00'N/67°00'W direct to 18°00'N/62°00'W direct to 18°00'N/60°00'W direct to 38°30'N/60°00'W direct to 38°30'N/69°15'W, thence counterclockwise along the New York Oceanic CTA/FIR boundary to the Miami Oceanic CTA/FIR boundary, thence southbound along the Miami Oceanic CTA/FIR boundary to the point of beginning.

(b) If the aircraft have not reported over a common point, it is possible to ensure, by radar or other approved means, that the appropriate time interval will exist at the common point from which they either follow the same track or continuously diverging tracks;

3. Between 9 and 5 minutes, provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique; and

(1) It is possible to ensure by radar or other approved means, that the required time interval exists and will exist at the common point from which they either follow the same track or continuously diverging tracks; and

(2) The preceding aircraft is maintaining a greater Mach number than the following aircraft in accordance with the following:

[a] 9 minutes, if the preceding aircraft is Mach 0.02 faster than the following aircraft;

[b] 8 minutes, if the preceding aircraft is Mach 0.03 faster than the following aircraft;

[c] 7 minutes, if the preceding aircraft is Mach 0.04 faster than the following aircraft;

[d] 6 minutes, if the preceding aircraft is Mach 0.05 faster than the following aircraft;

[e] 5 minutes, if the preceding aircraft is Mach 0.06 faster than the following aircraft.

NOTE-

When the preceding aircraft is maintaining a greater Mach number than the following aircraft, in accordance with the table above, and the aircraft will follow continuously diverging tracks so that the minimum lateral separation will be achieved by the next significant point, the requirement stated above, to have at least 5 minutes longitudinal separation where the minimum lateral separation is achieved, may be disregarded.

c. Between turbojet aircraft meeting the MNPS and operating in the New York oceanic CTA/FIR wholly or partly in MNPS airspace (*subsonic flight*):

1. 10 minutes, provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique; and

(a) Where tracks diverge from the common point:

(1) At least 10 minutes, longitudinal separation exists at the point where the tracks diverge; and

(2) At least 5 minutes, longitudinal separation will exist where 60 NM lateral separation is achieved; and

NOTE-

When the preceding aircraft is maintaining a greater Mach number than the following aircraft in accordance with this subparagraph, and the aircraft will follow continuously diverging tracks so that 60 NM lateral separation will be achieved by the next significant point, the requirement to have at least 5 minutes longitudinal separation where 60 NM lateral separation is achieved, may be disregarded.

(3) At least 60 NM lateral separation will be achieved at or before the next significant point (normally within ten degrees of longitude along track(s)) or, if not, within 90 minutes of the time the second aircraft passes the common point or is within 600 NM of the common point, whichever is estimated to occur first.

2. Between 9 and 5 minutes, provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique; and

(a) It is possible to ensure, by radar or other approved means, that the required time interval exists and will exist at the common point from which they either follow the same track or continuously diverging tracks; and

(b) The preceding aircraft is maintaining a greater Mach number than the following aircraft in accordance with the following:

(1) 9 minutes, if the preceding aircraft is Mach 0.02 faster than the following aircraft;

(2) 8 minutes, if the preceding aircraft is Mach 0.03 faster than the following aircraft;

(3) 7 minutes, if the preceding aircraft is Mach 0.04 faster than the following aircraft;

(4) 6 minutes, if the preceding aircraft is Mach 0.05 faster than the following aircraft;

(5) 5 minutes, if the preceding aircraft is Mach 0.06 faster than the following aircraft.

3. 15 minutes, between turbojet aircraft not covered in subparas c1 and 2.

d. Operations between aircraft not covered in subparas b or c (*subsonic flight*):

1. Operations at or above FL 200.

(a) 10 minutes, between turbojet aircraft, provided the Mach number technique is applied, in accordance with para 8-3-3, Mach Number Technique.

(b) Between turbojet aircraft, provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique, and *only* when it is possible to ensure by radar or other approved means that the required time interval exists and will exist at the common point, and the preceding aircraft is maintaining a greater Mach number than the following aircraft in accordance with the following:

(1) 9 minutes, if the preceding aircraft is Mach 0.02 faster than the following aircraft;

(2) 8 minutes, if the preceding aircraft is Mach 0.03 faster than the following aircraft;

(3) 7 minutes, if the preceding aircraft is Mach 0.04 faster than the following aircraft;

(4) 6 minutes, if the preceding aircraft is Mach 0.05 faster than the following aircraft;

(5) 5 minutes, if the preceding aircraft is Mach 0.06 faster than the following aircraft.

(c) Between all other turbojet aircraft:
15 minutes.

2. 20 minutes:

(a) Between aircraft operating below FL 200 west of 55° West;

(b) Between aircraft operating at all levels east of 55° West;

(c) Within the New York CTA/FIR;

(1) Between turbojet aircraft not covered by subparas d1(a) and (b) above;

(2) Between other than turbojet aircraft operating along routes extending between the U.S., Canada, or Bermuda and the Caribbean ICAO Region.

8-8-4. LATERAL SEPARATION

Provide lateral separation by assigning different flight paths whose widths or protected airspace do not overlap. Apply the following:

a. 60 NM:

1. Supersonic aircraft operating above FL 275 within the New York oceanic CTA/FIR.

2. Supersonic aircraft operating at or above FL 450 not covered in subpara 1 above.

NOTE-

This reduced lateral separation shall not be used if track keeping capability of the aircraft has been reduced for any reason.

3. Aircraft which meet the MNPS and while operating in the New York oceanic CTA/FIR which are in transit to or from NAT MNPS airspace.

b. 90 NM between aircraft operating:

1. Within WATRS;

2. West of 55° West between the U.S., Canada, or Bermuda and points in the Caribbean ICAO Region.

c. 100 NM between aircraft operating west of 55° West not covered by subparas a or b above.

d. 120 NM between aircraft operating east of 55° West.

8-8-5. VFR CLIMB AND DESCENT

a. In the Houston, Miami, and San Juan CTA's, IFR flights may be cleared to climb and descend in VFR conditions only:

1. When requested by the pilot; and

2. Between sunrise and sunset.

b. Apply the following when the flight is cleared:

1. If there is a possibility that VFR conditions may become impractical, issue alternative instructions.

2. Issue traffic information to aircraft that are not separated in accordance with the minima in this section.

Section 9. Pacific ICAO Region

8-9-1. APPLICATION

Provide air traffic control services in the Pacific ICAO Region with the procedures and minima contained in this section except when noted otherwise.

8-9-2. VERTICAL SEPARATION

Provide vertical separation in accordance with Chapter 4, IFR, Section 5, Altitude Assignment and Verification, except when aircraft operate within airspace where composite separation and procedures are authorized, apply the minima specified in para 8-9-5, Composite Separation Minima.

8-9-3. LONGITUDINAL SEPARATION

Provide longitudinal separation between aircraft as follows:

- a. Between all aircraft, *15 minutes*; or
- b. Between turbojet aircraft provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique:
 1. *10 minutes*; or
 2. Between *9 and 5 minutes* provided:
 - (a) It is possible to ensure by radar or other approved means that the required time interval will exist at the common point from which the aircraft either follow the same track or continuously diverging tracks; and
 - (b) The preceding aircraft is maintaining a greater Mach number than the following aircraft in accordance with the following table:
 - (1) *9 minutes* if the preceding aircraft is Mach 0.02 faster than the following aircraft.
 - (2) *8 minutes* if the preceding aircraft is Mach 0.03 faster than the following aircraft.
 - (3) *7 minutes* if the preceding aircraft is Mach 0.04 faster than the following aircraft.
 - (4) *6 minutes* if the preceding aircraft is Mach 0.05 faster than the following aircraft.
 - (5) *5 minutes* if the preceding aircraft is Mach 0.06 faster than the following aircraft.

8-9-4. LATERAL SEPARATION

Provide lateral separation by one of the following:

- a. Clear aircraft on different flight paths whose route widths or protected airspace do not overlap.
- b. Within areas where Required Navigation Performance 10 (RNP-10) separation and procedures are authorized, apply *50 NM* between RNP-10 approved aircraft.
- c. When aircraft operate within airspace where composite separation and procedures are authorized, apply the minimum specified in para 8-9-5, Composite Separation Minima.
- d. When subparas a, b, or c are not applicable, *apply 100 NM* between aircraft.

8-9-5. COMPOSITE SEPARATION MINIMA

Provide composite separation within the Central East Pacific (CEP) and North Pacific (NOPAC) composite route systems and where designated by facility directive in the Pacific Organized Track System (PACOTS) at and above FL 290 as follows:

- a. *1,000 feet* vertical separation; and
- b. *50 NM* lateral separation.

8-9-6. COMPOSITE SEPARATION ALTITUDE ASSIGNMENT

- a. Aircraft operating at or above FL 300 in a composite route system may be cleared at even flight levels. Additionally, aircraft may be cleared at even flight levels while joining, crossing, or leaving a composite route system provided such aircraft leaving the system are cleared to an appropriate odd cardinal flight level when noncomposite vertical or lateral separation is achieved.
- b. Aircraft (operating at or above FL 300) leaving a composite route system at an even cardinal flight level do not have to be assigned an odd cardinal flight level provided:
 1. The aircraft is being provided radar service; and
 2. The aircraft will be cleared for descent and approach to an airport within the facility's domestic FIR; and
 3. There is an operational advantage.

c. Aircraft operating on unidirectional routes or traffic flows may be assigned altitudes other than the appropriate altitude for direction of flight provided that 2,000 feet vertical separation is maintained between aircraft operating on the same route.

8-9-7. COMPOSITE SEPARATION APPLICATION

Provide composite separation in the CEP and the North Pacific (NOPAC) composite route systems and where designated by facility directive in the Pacific Organized Track System (PACOTS) as follows:

a. Clear an aircraft to join an outer route of the composite route system at other than the normal entry point provided:

1. Longitudinal or noncomposite vertical separation exists between that aircraft and any other aircraft on that route; and

2. Composite separation exists between that aircraft and any other aircraft on the next adjacent route.

b. Clear an aircraft to leave an outer route of the composite route system at other than the normal exit point provided its course diverges so that lateral spacing from the route system increases until noncomposite separation exists between that aircraft and any other aircraft in the composite route system.

c. Clear an aircraft to change from one route to an adjacent route within the composite route system provided:

1. Longitudinal or noncomposite vertical separation is maintained between that aircraft and any other aircraft on the route being vacated until that aircraft is established on the route to which it is proceeding; and

2. Longitudinal or noncomposite vertical separation exists between that aircraft and any other aircraft on the route to which that aircraft is proceeding; and

3. Composite separation exists between that aircraft and any other aircraft on the next adjacent route.

d. Clear an aircraft to cross the composite route system provided longitudinal or noncomposite vertical or lateral separation exists between that aircraft and any other aircraft in the composite route system.

e. Clear aircraft to transition to or from the composite route system from an Oceanic Transition Route (OTR) provided:

1. The OTR is charted on aeronautical charts; and

2. Composite separation is maintained between that aircraft and any other aircraft within the composite route system; and

NOTE-

An aircraft is within the confines of a composite route system when the aircraft joins or crosses the outer route of the composite route system or passes a composite route entry point.

3. Composite separation is maintained between that aircraft and any other aircraft on adjacent OTR's.

f. Clear an aircraft to change altitude on a route if noncomposite separation exists between that aircraft and others operating on that route regardless of other aircraft operating on adjacent routes in the system. Pilot's discretion climbs and descents are not authorized when applying composite separation.

NOTE-

Although composite separation is not applied between aircraft on different tracks at FL 280 and FL 290, this paragraph applies to climbs and descents between FL 280 and altitudes within the composite altitude stratum (FL 300 and above).

8-9-8. VFR CLIMB AND DESCENT

a. In the Pacific CTA, IFR flights may be cleared to climb and descend in VFR conditions only if the following conditions are met:

1. When requested by the pilot.

2. Between sunrise and sunset.

b. Apply the following when the flight is cleared.

1. If there is a possibility that VFR conditions may become impractical, issue alternative instructions.

2. Issue traffic information to aircraft that are not separated in accordance with the minima in this section.

8-9-9. PROCEDURES FOR WEATHER DEVIATIONS AND OTHER CONTINGENCIES IN OCEANIC CONTROLLED AIRSPACE

Aircraft must request an ATC clearance to deviate. Since aircraft will not fly into known areas of weather, weather deviation requests should take priority over routine requests. If there is conflicting traffic and ATC is unable to establish standard separation, ATC shall:

a. Advise the pilot that standard separation cannot be applied;

b. If possible, suggest a course of action; and

NOTE-

1. ATC may suggest that the pilot climb or descend to a contingency altitude (1,000 feet above or below that assigned if operating in an area of 2,000 feet standard vertical separation; 500 feet above or below that assigned if operating in an area of 1,000 feet standard vertical or composite separation).

2. Once the deviating aircraft has begun a maneuver without an ATC clearance in response to weather or other contingency, the controller is not responsible for providing standard separation between the aircraft that is deviating and any other aircraft or airspace. Responsibility for providing standard separation resumes when the deviating aircraft has advised ATC that it has returned to its original or a revised ATC cleared level and track.

c. To the extent practical, provide traffic information for all affected aircraft.

PHRASEOLOGY-

STANDARD SEPARATION NOT AVAILABLE; SUGGEST CLIMB (or descent) TO (appropriate altitude); TRAFFIC (position and altitude); REPORT DEVIATION COMPLETE.

d. The pilot will follow the advisory altitude when approximately 10 NM from track.

e. At the completion of the deviation, ATC shall establish standard separation as soon as practicable.

NOTE-

In the event that pilot/controller communications cannot be established or a revised ATC clearance is not available, pilots will follow the procedures outlined in the Aeronautical Information Manual (AIM) and Chart Supplements.

Section 10. North American ICAO Region- Arctic CTA

8-10-1. APPLICATION

Provide air traffic control services in the North American ICAO Region - Arctic CTA with the procedures and minima contained in this section.

8-10-2. VERTICAL SEPARATION

Provide vertical separation in accordance with Chapter 4, IFR, Section 5, Altitude Assignment and Verification.

8-10-3. LONGITUDINAL SEPARATION

Apply the following minimum longitudinal separation:

- a. *15 minutes* between aircraft; or

b. Provided the Mach number technique is applied in accordance with para 8-3-3, Mach Number Technique:

1. *10 minutes* when the preceding aircraft is at least Mach 0.03 faster than the following aircraft; or

2. *5 minutes* when the preceding aircraft is at least Mach 0.06 faster than the following aircraft.

8-10-4. LATERAL SEPARATION

Provide *90 NM* lateral separation between aircraft, except that lower minima in 7.2 of Part 3 of the Procedures for Air Navigation-Rules of the Air (PANS-RAC), (Doc 4444-RAC/501) may be applied or further reduced in accordance with para 9 of the same part where the conditions specified in the relevant PANS-RAC are met.